

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 November 2001 (22.11.2001)

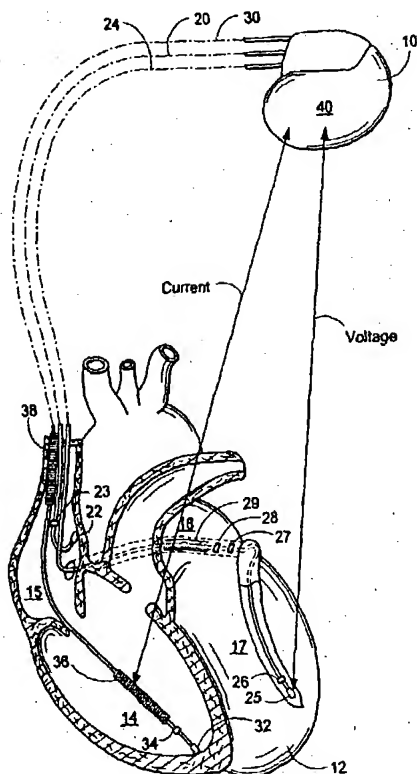
PCT

(10) International Publication Number  
WO 01/87410 A3

- (51) International Patent Classification<sup>7</sup>: A61N 1/365
- (21) International Application Number: PCT/US01/15520
- (22) International Filing Date: 14 May 2001 (14.05.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/204,310 15 May 2000 (15.05.2000) US
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European

[Continued on next page]

(54) Title: CARDIAC STIMULATION DEVICES AND METHODS FOR MEASURING IMPEDANCES ASSOCIATED WITH THE LEFT SIDE OF THE HEART



(57) Abstract: Methods of and systems for measuring at least one physiological parameter for assessing a patient's cardiac condition based on left heart impedance measurements are described. Various embodiments establish a current flow through a left side of the heart and measure a voltage between a first location on or in the left side of the heart and a second location within the human body while establishing the current flow. The inventive techniques and systems can be used for, among other things, measuring progression or regression of myocardial failure, dilation, or hypertrophy, pulmonary congestion, myocardial contractility, or ejection fraction. The measured voltage, related to left heart impedance, can be used to monitor patient condition for diagnostic purposes or to adapt pacing or defibrillation therapy. Therapy adaptation can include controlling pacing modes, pacing rates, or interchamber pacing delays, for example.

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patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,  
IT, LU, MC, NL, PT, SE, TR). OAPI patent (BF, BJ, CF,  
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:  
21 March 2002

**Published:**  
— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/15520

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A61N1/365

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61N A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 990 451 A (MEDTRONIC INC) 5 April 2000 (2000-04-05)  the whole document	1-7, 11-23, 29, 33-39, 58,66
X	WO 99 30777 A (ROOS CUBUS DE ;BAKELS ARNOLDUS (NL); LEINDERS ROBERT (NL); MEDTRONIC) 24 June 1999 (1999-06-24)  the whole document	1-7, 11-23, 29, 33-39, 58,66
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☒ Further documents are listed in the continuation of box C

☒ Patent family members are listed in annex

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Date of the actual completion of the international search

12 November 2001

Date of mailing of the international search report

20/11/2001

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/15520

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 4 674 518 A (SALO RODNEY W) 23 June 1987 (1987-06-23)  the whole document ---	1-7, 11-23, 29, 33-39, 58,66
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International Application No

PCT/US 01/15520

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